



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,286	05/04/2006	Steven T. Peake	GB03 0199 US1	1832
65913	7590	05/02/2008	EXAMINER	
NXP, B.V. NXP INTELLECTUAL PROPERTY DEPARTMENT M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131			KIM, SUN M	
			ART UNIT	PAPER NUMBER
			2813	
			NOTIFICATION DATE	DELIVERY MODE
			05/02/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary	Application No. 10/578,286	Applicant(s) PEAKE, STEVEN T.	
	Examiner SUN M. KIM	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the filing of the Applicant's Amendment on January 16, 2008.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1 and 5** are rejected under 35 U.S.C. 102(b) as being anticipated by Werner et al. (DE 100 07 415, as cited by Applicant).

3. **In re claim 1**, Werner et al. shows an insulated gate field effect transistor, comprising (Figure 1):

- a semiconductor body defining opposed first and second major surfaces;
- a drain region 60 & 20 of a first conductivity type extending vertically between the second major surface and part of the first major surface;
- a body region 30 of a second conductivity type opposite to the first conductivity type extending from the first major surface to a body depth;
- a source region 40a & 40b of the first conductivity type adjacent to the body region 30 at the first major surface;
- a source contact S contacting the source region 40a & 40b and a drain contact D contacting the drain region 60 & 20; and

Art Unit: 2813

- an insulated gate 50a & 50b extending laterally over the first major surface over the body region 30, defining a channel region extending in the body region 30 from a source end adjacent to the source region 40a & 40b to a drain end adjacent to a drain end part of the drain region 20, further comprising:
- a conductive shield plate 90a & 90b for shielding the gate 50a & 50b, extending in an insulated trench 70a & 70b from the first major surface towards the second major surface, the conductive shield plate 90a & 90b being separated from the body region 30 by part of the drain region 20 including the channel end part of the drain region 20 and the conductive shield plate 90a & 90b being electrically connected to the source region 40a & 40b (lines from shield plate 90 connect with line from source contact S).

4. **In re claim 5**, Werner et al. shows that the shield plate trench 70a & 70b extends to a depth that is substantially equal to the body 30 depth (Figure 1). It should be noted that extending to a depth does not limit the extending element.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 6 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner et al.

7. **In re claim 6**, Werner et al. does not teach that the shield plate trench 70 is at a depth between about 50% and about 200% of the depth of the body region 30, however, it would have been obvious to one having ordinary skill in the art at the time of the invention to do so since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233, 1955).

8. **In re claim 9**, Werner et al. does not teach that the gate extends over the channel end of the part of the drift region by no more than about 0.4 microns, however, it would have been obvious to one having ordinary skill in the art at the time of the invention to do so since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233, 1955).

9. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Werner et al. in view of Kim et al. (US Patent 6,133,116). Werner et al teaches that the first conductivity is n-type (for elements 60, 20 and 40) and that the second conductivity type is p-type (for element 30). Werner et al. also teaches that the shield plate 90a & 90b can be polysilicon (page 3, Line 52). Werner et al. does not teach that the shield plate 90a & 90b can be p-type doped polysilicon, however, Kim et al. teaches that a shield plate can be p-type doped polysilicon. It would have been obvious to one having

Art Unit: 2813

ordinary skill in the art at the time of the invention to dope the shield plate of Werner et al. since it was well known in the art that doping polysilicon significantly decreases electrical resistance.

10. **Claims 2 - 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner et al. in view of Iijima et al. (JP 60-38877, as cited by Applicant).

11. **In re claim 2**, Werner et al. does not teach a conductive shield plate extension extending laterally over the first major surface of the drain region from the shield plate towards the channel end part of the drain region, however, Iijima et al. shows a lateral shield plate 8 (Figure 4) which is separated by an insulator 5 from a drain region 1a and laterally separated from gate 6. It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the shield plates of Werner et al. with that of Iijima et al. such that a shield plate has a vertical extension and a lateral extension since doing so would provide a higher shielding effect.

12. **In re claim 3**, Werner et al. does not teach that an insulator extends under both the gate and the shield plate extension, however, Iijima et al. teaches that a the same insulator 5 can be used for isolating both the gate 6 and the shield plate 8 from the substrate. It would have been obvious to one having ordinary skill in the art at the time of the invention to use the same insulating layer to insulate two adjacent elements which need to be isolated since doing so would reduce the number of insulation steps during the manufacture of a shielded transistor.

13. **In re claim 4**, Werner et al. in view of Iijima et al. does not teach that the lateral gap between a shield plate extension and a gate is in the range of about 0.05 to about 0.2 microns, however, it would have been obvious to one having ordinary skill in the art at the time of the invention to do so since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233, 1955).

14. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Werner et al. as applied to claim 1 above, or unpatentable over Werner et al. in view of Iijima et al. as applied to claim 2 above, or unpatentable over Werner et al. in view of Kim et al. as applied to claim 7 above. Werner et al. does not teach that the lateral gap between the shield plate trench 70 and the body region 30 is between about 0.5 and about 2 microns, however, it would have been obvious to one having ordinary skill in the art at the time of the invention to do so since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233, 1955).

Response to Arguments

15. The arguments presented in view of claim 5 was not found persuasive. Kato does show that electrode 21 is *physically* connected to source 12 (Figure 5). The amendment as shown in amended claim 1 recites an electrical connection which Kato does not show. A new rejection as made for claim 1 above.

Art Unit: 2813

16. Applicant's arguments, see Applicant Remarks, filed January 16, 2008, with respect to the rejection(s) of claim(s) 7 under 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Werner et al in view of Kim et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUN M. KIM whose telephone number is (571)270-1431. The examiner can normally be reached on Monday - Thursday 10:30 am - 8:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Carl Whitehead Jr./
Supervisory Patent Examiner, Art Unit 2813

/SMK/ 4/28/08